

# ● PRINTER RUSH ●

(PTO ASSISTANCE)

Application : <u>10/786,357</u>	Examiner : <u>Ghyka</u>	GAU : <u>2812</u>
From: <u>MR</u>	Location: <u>(IDC) FMF FDC</u>	Date: <u>12-02-05</u>
Tracking #: <u>EPM 10786357</u>		Week Date: <u>10-31-05</u>

DOC CODE	DOC DATE	MISCELLANEOUS
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MR

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REV 10/04

Date of Deposit May 29, 2002

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THERMAL TREATMENT EQUIPMENT AND METHOD FOR  
HEAT-TREATING

Name, ARMANDO CHINER  
(typed or printed)

BACKGROUND OF THE INVENTION

5 The present invention relates to a method for ~~heat treating and a thermal~~ treatment equipment applying the method. Particularly, the invention relates to the thermal treatment equipment heating a substrate or a formed matter on the substrate by heated gas and the method for heat-treating using the equipment.

10 In a manufacturing process of a semiconductor device, thermal treatments aiming at oxidation, diffusion, gettering, and recrystallization after ion injection with respect to a semiconductor or a semiconductor substrate are programmed. A typical example of the equipment performing these thermal treatments is a hot wall type annealing furnace of horizontal type or vertical type, which is used widely.

15 The annealing furnace of horizontal type or vertical type is batch type equipment treating many substrates in a lump. For example, the vertical annealing furnace mounts a substrate on a susceptor formed by quartz horizontally and in parallel, and performs putting in and out to a reaction pipe by an elevator driving up and down. At outer circumference portion of a bell-jar type reaction pipe, a heater is provided so as to heat a substrate by the heater. It takes comparatively long time for  
20 rising time reaching the predetermined heating temperature and falling time cooling to temperature possible to take out because of the construction thereof.

Incidentally, in MOS transistor used for an integrated circuit, very high process accuracy is required as elements become fine. Especially, it needs to diffuse impurity at the minimum for forming thin junction. However, process taking long  
25 time for rising temperature and falling temperature as the annealing furnace makes forming thin junction difficult.

Rapid thermal anneal (described RTA hereafter) method is developed as thermal treatment technique performing rapid heating and rapid cooling. An RTA equipment heats a substrate or a formed matter on the substrate rapidly using  
30 infrared ray lamp so as to perform thermal treatment in short time.

→ heat treating and a thermal